

# Antenna Launching

Alan B, W6AKB, Pacificon 2022

[AntennaLaunchers.com](https://AntennaLaunchers.com)

# What Is Antenna Launching?

In 2002 Eric WD6CMU and I were developing our Pneumatic Launchers

I chose “Pneumatic Antenna Launching” and “AntennaLaunchers.com”

The term has caught on and is in common use today for many systems!

We launch lines, not Antennas, but “Antenna Line Launcher” was too long..

Launching Antenna Wires (conductors) IS NOT SAFE Because Power Lines

This presentation is information - you decide what works for your situation

Safety First - we share some of our experience, you do you at your own risk

# Antenna Launching in my Early Ham Radio Days

We are shaped by our experiences, especially early ones

My early antennas (1970) were tree supported - techniques: Climbing, Tossing

Petaluma DX and Experimenter's Club Field Day Tower Accident

We started doing our own Field Day expeditions to the Sierras soon after

Climbing was not going to work with tall Sierra trees (some attempted it)

Slingshots, Archery, later Pneumatic Launchers, recently Drones were tested

Today we review the range of Antenna Launching solutions

But first, an example of what we do now on Field Day

# Antenna Launching an HF Yagi on Field Day

Not just Wire Antennas

Top line between treetops

Offset pulley, hoisting yagi

Boom end lines control heading

Yagi at 50 feet - no tower,  
no climbing, no problem  
(Frank N6OI's TH3JR)

High Sierra Field Day Group



# Low Height Range (30 Feet, 10 Meters)

Quick and Easy, Good Enough for Parks, Summits and many Home Installations

Throwing - Rocks, Sticks, Knots, Water Bottles, Tools - works but not optimal

Telescoping Pole - precision placement, drop line through loop on end

Throw a weighted tennis ball with attachment loop, (4-6 oz)

Use Arborist Throw Bag (8-16 oz) and Line - the best solution?

How much Weight - enough to pull line down, but easy to throw, (6-16 oz)

Lines - Fishing Line, Nylon Monofilament, Spectra, Bank Line, Twine, ParaCord,

Dacron - Friction, Visibility, Stretch, Strength

# Medium Height Range (70 Feet, 20 Meters)

Arborist Throw Bag & Line, Line Bag or Cube (folds to small triangle)

Best for  
this  
Range



Special Techniques - see Arborist  
internet videos



# Medium Height Range (60-100 Feet, 18-30 Meters)

Slingshots - Compact, popular DIY

Commercial (EZ Hang - DX Eng)

Quiet, Lead Sinkers, 'Dog' Balls

Fishing Reel/Line (Drag, Nylon)

Safety & Legal issues

Lots of Near Misses, some Accidents



Dummy Launchers / Dog Trainers (Amazon)

May be considered Firearms or be Licensed?

# Higher Height Range (100+ Feet, 30+ Meters)

Archery - Bow and special custom Arrows, Reel, Line - we used these for many years, quiet, had one serious “near miss” accident, bulky, fragile, hazardous, skill and strength required not recommended anymore

Sherrill BigShot - monster slingshot

- launches Arborist Throw Bag, trigger,
- quiet, spendy, bulky, awkward
- there are better solutions





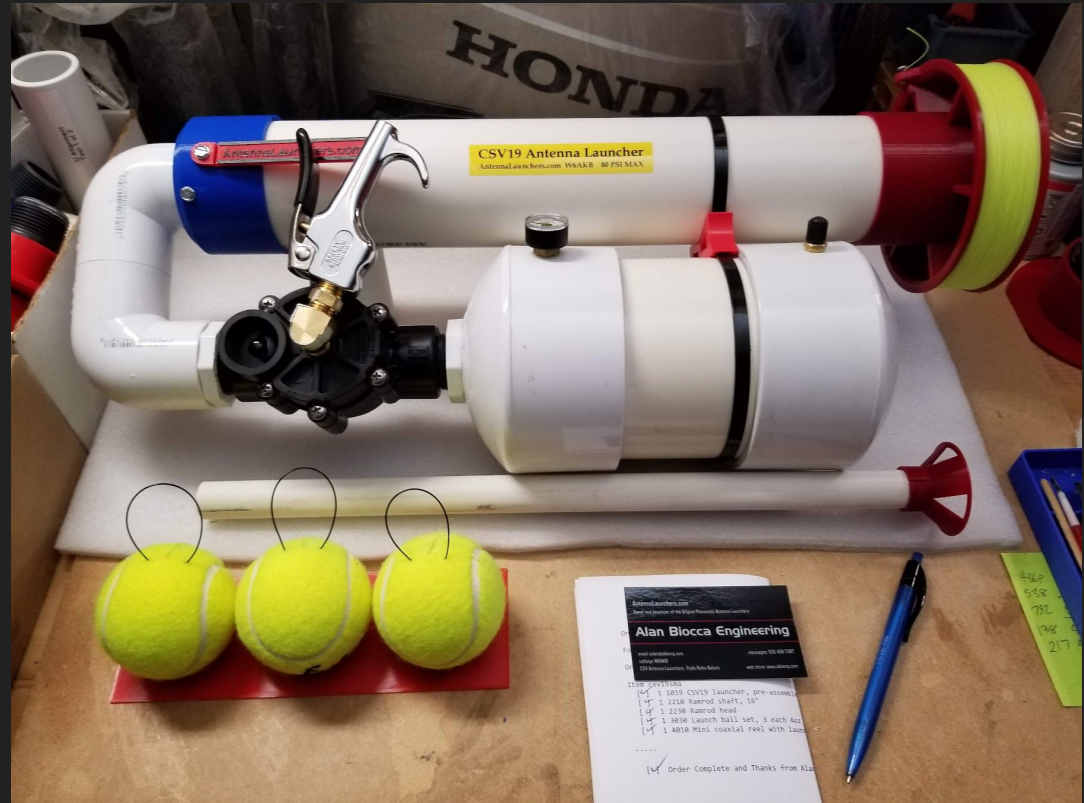
# Pneumatic Launchers (150+ Feet, 50+ Meters, or more)

Point and Shoot, Optimized  
Compressed air, fast valve with  
high flow, adjustable, quiet

Size for projectile - weighted  
tennis balls, throw bags, etc

Some make them larger or for  
rigid projectiles which increases  
hazards

CSV19 fits in 20 inch plastic tub



# Anatomy of a Pneumatic Launcher

Pressure Chamber, Fill Valve, Gauge

Safety Valve prevents overpressure

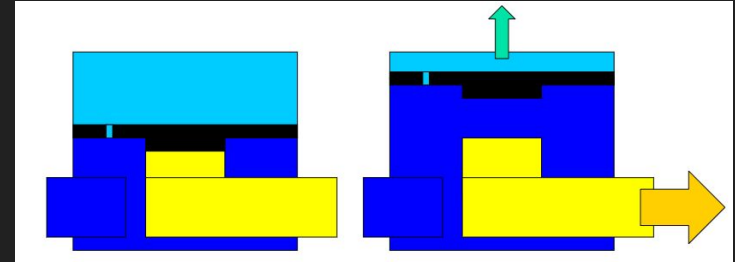
Piloted Main Valve, Trigger Valve

Barrel - SDR21 PVC Fits Tennis Balls

Soft, Weighted Projectiles, No Stretch  
Hi-Vis Line, Large Coaxial Reel

Ramrod, Compressed Air Source

CSV17 Launcher fits in 18" tool case



# Antenna Launching Artillery

Dialing it up to 11 - Next Level

Purpose built for specific use-case

10 foot by 2 inch diameter barrel

Dual 2 inch flow diameter valves

Cement filled PVC projectile

600 foot range - across a ravine

Courtesy of AI, NH7O

By Eric WD6CMU 2002





# Drones & Quadcopters (400 Feet, 120 Meters)

Stabilized photography  
drones can tilt camera  
forward or down

Dropper can be added to  
facilitate the process

Requires Piloting Skill

FAA Rules, Registration

Can get Expensive...



# Safety and Hazard Mitigation

Personal Protective Equipment - Eye protection, Gloves, Hard Hat

Avoid Rigid Projectiles - PVC “bullets”, Arrows, Lead Sinkers

Avoid Combustion Launchers - not consistent, control & legal issues

Energy storage in stretchy line - especially nylon monofilament, etc

Pulling out stuck projectiles can recoil, thin lines can cut, branches can fall

PVC loses strength / becomes brittle outside normal temperatures, UV

PVC is commonly used for but not recommended for compressed air

Avoid Drain Pipe and Fittings, these are Not Rated For Pressure Applications

# Making Your Own Pneumatic Launcher

Manual or electric valves are slow, rigid projectiles are hazardous

Use Only Pressure Rated Pipe and Fittings

Use Appropriate Primer and Cement (or One Step) and Follow Directions

Use Fresh, Clean, and Dry Pipe, Fittings and Cement, allow cement to fully dry

Cements & Primers are flammable solvents, use in ventilated area, avoid ignition

Drill and thread only in double-thick areas, stress can initiate cracks

Make it powerful enough but not more than required

Plan how to store and transport launcher to avoid damage

# Pressure Rated vs Drain Waste Vent Pipe and Fittings

ABS, Cellcore always DWV not pressure

PVC comes in Pressure and DWV types

DWV materials not safe for Pressure use

Schedule 40 rating is Size, not Pressure

Pressure PVC has more than 2:1 margin

Pressure Rated PVC is thicker to be stronger, avoids weakness from angles & flats, has deeper cement sockets

Learn to Recognize DWV components



# Recognizing Issues

DWV Fittings: 2

Single thickness  
threaded hole

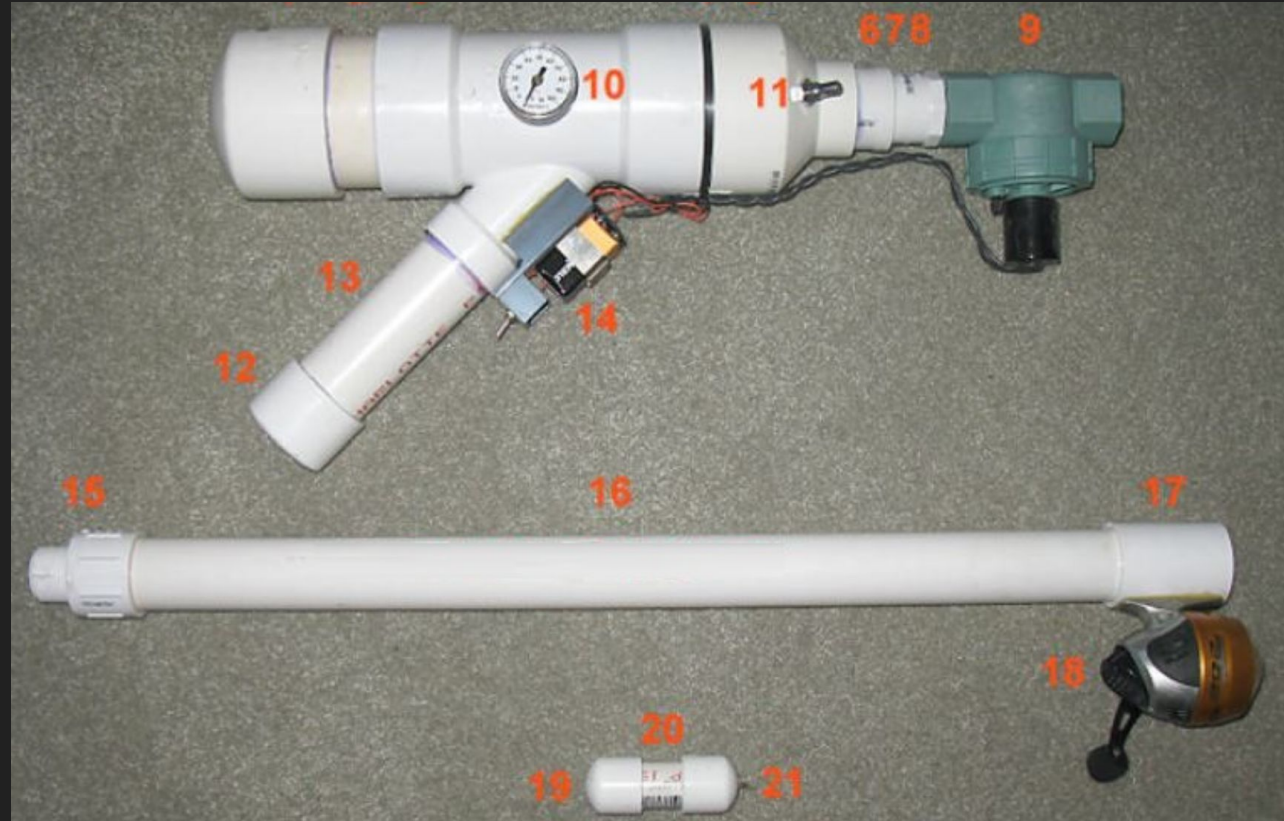
Rigid Projectile

Electric Actuation

Reel Drag

Linear Design

[AirCannonPlans.com](http://AirCannonPlans.com)



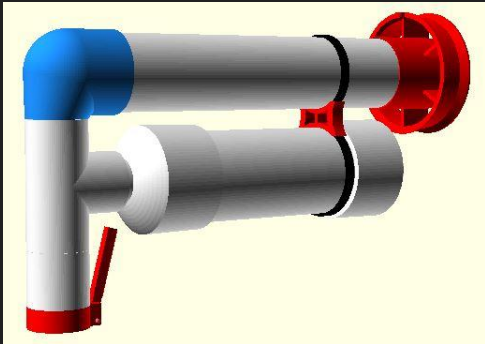


# Gas Gun Design Tool (GGDT)

By Dave Hall,  
rocket test engineer

Tool for launcher design &  
performance estimation

[www.spudfiles.com](http://www.spudfiles.com)



Gas Gun Design Tool (GGDT)

File Help

<b>Reservoir Data</b>	<b>Valve Data</b>	<b>Barrel Data</b>
Gas: Air	Type: Pilot	Bore (in): 2.5
Pressure (psig): 40	Flow Coef. (Cv): 6	Length (in): 15
Temperature (F): 75	Seat Diameter (in): 1	<b>Projectile Data</b>
Outer Diameter (in): 4	Piston Diameter (in): 1.2	Friction (psi equiv.): 1
Inner Diameter (in): 0	Return Force (lbf): 1	Initial Position (in): 1
Length (in): 8	Vent Diameter (in): .2	Diameter (in): 2.5
Volume (in <sup>3</sup> ): 100.53	Vent to...: External	Mass (gm): 113

Recalculate

**Warnings/Notes**

\*\*\* No errors detected

**Y-Axis**  
Projectile Velocity (ft/s)

**X-Axis**  
Projectile Position (in)

**Results**

Travel Time (ms): 17      Muzzle Velocity (ft/s): 103

A line graph showing the relationship between projectile position and velocity. The x-axis is labeled 'Projectile Position (in)' and ranges from 0 to 16. The y-axis is labeled 'Projectile Velocity (ft/s)' and ranges from 0 to 120. A red curve starts at approximately (1, 0) and rises steeply, then levels off as it approaches a velocity of 100 ft/s at a position of 15 inches. The curve is smooth and continuous, indicating a steady acceleration of the projectile as it travels down the barrel.

Projectile Position (in)	Projectile Velocity (ft/s)
1	0
2	45
4	75
6	85
8	92
10	96
12	98
14	99
15	100

# Questions?



Alan & PV17 by Dave W6PS (sk)

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CSV17d in Nanuk 930

